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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/764,149	01/23/2004	Mark L. La Forest	H0006156-1160	8154

128 7590 10/16/2007
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EXAMINER

WOLLSCHLAGER, JEFFREY MICHAEL

ART UNIT	PAPER NUMBER
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1791

MAIL DATE	DELIVERY MODE
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10/16/2007

PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No. 10/764,149	Applicant(s) FOREST ET AL.	
	Examiner Jeff Wollschlager	Art Unit 1791	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☒ Responsive to communication(s) filed on 11 July 2007.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 9,12 and 15-17 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 9,12 and 15-17 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).
- 11) ☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

- 12) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
 2. ☐ Certified copies of the priority documents have been received in Application No. _____.
 3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

- | | |
|-------------------------------------------------------------------------------------------------------------|-----------------------------------------------------------------------------------------|
| 1) <input type="checkbox"/> Notice of References Cited (PTO-892) | 4) <input type="checkbox"/> Interview Summary (PTO-413)
Paper No(s)/Mail Date: _____ |
| 2) <input type="checkbox"/> Notice of Draftsperson's Patent Drawing Review (PTO-948) | 5) <input type="checkbox"/> Notice of Informal Patent Application |
| 3) <input type="checkbox"/> Information Disclosure Statement(s) (PTO/SB/08)
Paper No(s)/Mail Date: _____ | 6) <input type="checkbox"/> Other: _____ |

DETAILED ACTION

Response to Amendment

Applicant's amendment to the claims filed July 11, 2007 has been entered. Claims 9 and 17 are currently amended. Claims 9, 12, and 15-17 are pending and under examination.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

This application currently names joint inventors. In considering patentability of the claims under 35 U.S.C. 103(a), the examiner presumes that the subject matter of the various claims was commonly owned at the time any inventions covered therein were made absent any evidence to the contrary. Applicant is advised of the obligation under 37 CFR 1.56 to point out the inventor and invention dates of each claim that was not commonly owned at the time a later invention was made in order for the examiner to consider the applicability of 35 U.S.C. 103(c) and potential 35 U.S.C. 102(e), (f) or (g) prior art under 35 U.S.C. 103(a).

Claims 9, 12, 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Hecht (U.S. 5,654,059) in view of Bauer (U.S. 3,991,248).

Regarding claim 9, Hecht teaches a method of manufacturing a preform for brake friction components (col. 7, lines 20-21) comprising: placing carbon fibers comprising loose fibers in the absence of binders (col. 4, lines 55-61; col. 5, lines 43-48) into a constraint fixture having a bottom plate (col. 14, lines 54-56), and an internal area corresponding in shape to the shape of the desired preform (col. 4, lines 55-62; col. 7, lines 21-24), with the internal area being defined

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by flat faces/plates (col. 7, line 23) that are perforated (col. 7, lines 28-34) and annular (col. 7, lines 21-24) including a perforated annular ejector/stripper plate (col. 15, lines 10-14) and a perforated annular top plate/closure (col. 7, lines 28-33) with an inner and outer wall (col. 14, lines 54-56), compressing/compacting the carbon fiber material with a needle press to form a fibrous matrix (col. 10, lines 57-60; col. 11, lines 10-13), and subjecting the material in the constraint fixture to further densification by one or more of carbon vapor deposition, resin transfer molding, or resin or pitch infiltration (col. 9, lines 63-col. 10, line 8; col. 12, lines 49-51; col. 15, lines 21-25; col. 15, lines 67-col. 16, line 5).

Hecht teaches the loose fibers are produced from chopped tow (col. 6, lines 21-22). The tow is sprayed/flows in a continuous stream into the constraint fixture (col. 6, lines 46-64; col. 7, lines 41-47).

Hecht does not teach pressing at a pressure of about 3-10 atmospheres. Additionally, Hecht does not expressly state that the constraint fixture is removed from the mold apparatus/needle press prior to subjecting the material in the constraint fixture to further densification, but only that that the mold may be fitted with a removable closure (col. 7, lines 28-39). However, Hecht does teach manufacturing preforms of different densities (col. 13, lines 41-45) and different thicknesses (col. 9, lines 6-10).

Bauer discloses in an analogous method of producing fiber reinforced composite materials employment of a portable constraint fixture/compression fixture that is adjusted to accurately control the density and thickness by an adjusting/molding apparatus, (Figure 14; Figure 6; Figure 1; col. 2, lines 65-col. 3, line 7; col. 5, lines 16-20; col. 7, lines 6-35) by compressing the material to form a shaped substrate/preform of optimum fiber volume and density (col. 8, lines 15-33) and then placing the preform/substrate while it is still held by the

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fixture into a furnace for densification (col. 11, lines 19-42) which intrinsically involves removing it from where the adjusting process took place prior to placement in the furnace.

Therefore it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to employ a compressing/constraining fixture such that the preform/substrate is held by the fixture during movement between processing steps such as is disclosed by Bauer in the method disclosed by Hecht for the purpose as disclosed by Bauer and suggested by Hecht (col. 7, lines 16-40) of employing a fixture that promotes production of a part having tight density and physical dimension tolerances with appropriate strength (Bauer: col. 1, lines 26-35) by accurately constraining the substrate/preform to its formed configuration (Bauer: col. 3, lines 15-17). Additionally it is noted that the density and thickness of the article compressed in the fixture are impacted by the chosen compression pressure. As such, one would have to take all of these variables into consideration when determining the pressure at which to compact the fibers. As such, the pressure would have been readily optimized as is routinely practiced in the art.

As to claim 12, Hecht teaches placing a veil/scrim/perforated foam sheet into the mold cavity (col. 7, lines 30-33; col. 14, lines 4-5).

As to claim 15, Hecht teaches the brake friction component preform is configured as a brake for a disc brake for an aircraft (col. 1, lines 45-47).

As to claim 16, Hecht teaches the mold apparatus comprises a locking means (col. 15, lines 10-15) for maintaining the top plate in place in the constraint fixture. Further, the method of Hecht implicitly includes a means for lifting the constraint fixture out of the mold apparatus/needle press.

Claims 9, 12, 15 and 16 are rejected under 35 U.S.C. 103(a) as being unpatentable over Snyder (U.S. 5,686,117) in view of Bauer (U.S. 3,991,248).

Regarding claim 9, Snyder et al. teach a method of manufacturing a preform for brake friction components (col. 1, lines 10-17) comprising: placing carbon fibers comprising loose fibers in the absence of binders (col. 3, lines 52-55; col. 3, line 65 - col. 4, line 2) into a constraint fixture having a bottom plate (Figure 2, element (48)), and an internal area corresponding in shape to the shape of the desired preform (Figure 2, element (60)), with the internal area being defined by annular perforated plate including an ejector/separator plate and a top/separator plate, an inner wall, and an outer wall in a mold apparatus (Figure 2, elements (58), (62), (56), and (24)), chopping continuous fiber tow to produce loose materials and spraying/dispensing carbon fiber materials into said dispenser (col. 3, lines 36-55); compressing the carbon fibers to form a fibrous matrix (col. 6, lines 7-9), removing the constraint fixture from the mold apparatus (col. 6, lines 9-10; col. 6, lines 14-16; col. 5, lines 25-27 – hydraulic or pneumatic compression means of the constraint fixture is included as part of the mold apparatus), and subjecting the materials in the constraint fixture to densification by one or more of resin transfer molding resin or pitch infiltration of carbon vapor deposition (col. 4, lines 24-28; col. 6, lines 14-16). It is further noted that Snyder et al. teach that it is preferable, but not required, to remove the separator plates prior to densification. Snyder et al. do not teach employment of a perforated ejector plate comprising perforations in the area upon which the carbon fiber material is placed.

However, Bauer discloses in an analogous method of producing fiber reinforced composite materials employment of a portable constraint fixture/compression fixture that is adjusted to accurately control the density and thickness by an adjusting/molding apparatus, (Figures 14; Figures 6; col. 2, lines 65-col. 3, line 7; col. 5, lines 16-20; col. 7, lines 6-35) by

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compressing the material to form a shaped substrate/preform of optimum fiber volume and density (col. 8, lines 15-33) and then placing the preform/substrate while it is still held by the fixture into a furnace for densification (col. 11, lines 19-42) which implicitly involves removing it from where the adjusting process took place. The compression fixture utilized by Bauer employs perforated plates upon which carbon fiber material is placed in order to facilitate circulation of the densifying material.

Therefore it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to employ a compressing/constraining fixture with a plurality of perforations such as that employed by Bauer in the method disclosed by Snyder for the purpose, as disclosed by Bauer, of employing a fixture that promotes production of a part having tight density and physical dimension tolerances with appropriate strength (col. 1, lines 26-35) by accurately constraining the substrate/preform to its formed configuration (col. 3, lines 15-17). Additionally it is noted that the density and thickness of the article compressed in the fixture are impacted by the pressure employed. As such, one would have to take all of these variables into consideration when determining the pressure at which to compact the fibers. As such, the pressure would have been readily optimized as is routinely practiced in the art.

As to claim 12, Bauer discloses sheets of carbon material surrounding loose fibers within the fixture. These sheets intrinsically function as a veil (Figure 4).

As to claim 15, Snyder et al. teach the brake friction component is configured as an aircraft landing system brake (col. 1, lines 10-17).

As to claim 16, Snyder et al. teach locking means to maintain the top plate in place in the constraint fixture (Figure 2, elements (64), (50), (70), and (72)). Further, the method implicitly includes a means for lifting the constraint fixture out of the mold apparatus since Snyder et al. teach transporting the constraint fixture through subsequent unit operations.

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Snyder (U.S. 6,183,583) in view of Bauer (U.S. 3,991,248) and Ockers (U.S. 2003/0214081).

Regarding claim 17, Snyder et al. teach a method of manufacturing a preform for brake friction components (col. 1, lines 10-17) comprising: placing carbon fibers comprising loose fibers in the absence of binders (col. 3, lines 52-55; col. 3, line 65 - col. 4, line 2) into a constraint fixture having a bottom plate (Figure 2, element (48)), and an internal area corresponding in shape to the shape of the desired preform (Figure 2, element (60)), with the internal area being defined by annular perforated plates including an ejector/separator plate and a top/separator plate, an inner wall, and an outer wall in a mold apparatus (Figure 2, elements (58), (62), (56), and (24)), compressing the carbon fibers to form a fibrous matrix (col. 6, lines 7-9), removing the constraint fixture from the mold apparatus (col. 6, lines 9-10; col. 6, lines 14-16; col. 5, lines 25-27 – hydraulic or pneumatic compression means of the constraint fixture is included as part of the mold apparatus), and subjecting the materials in the constraint fixture to densification by one or more of resin transfer molding, (col. 4, lines 24-28; col. 6, lines 14-16). It is further noted that Snyder et al. teach that it is preferable, not required, to remove the separator plates prior to densification. It is further noted that the recitation in Snyder et al.: “impregnation of resin...is employed to densify the preform” (col. 4, lines 25-27) is understood to be resin transfer molding. Snyder et al. do not teach employment of a perforated ejector plate comprising perforations in the area upon which the carbon fiber material is placed.

However, Bauer discloses in an analogous method of producing fiber reinforced composite materials employment of a portable constraint fixture/compression fixture that is adjusted to accurately control the density and thickness by an adjusting/molding apparatus, (Figures 14; Figures 6; col. 2, lines 65-col. 3, line 7; col. 5, lines 16-20; col. 7, lines 6-35) by

compressing the material to form a shaped substrate/preform of optimum fiber volume and density (col. 8, lines 15-33) and then placing the preform/substrate while it is still held by the fixture into a furnace for densification (col. 11, lines 19-42) which implicitly involves removing it from where the adjusting process took place. The compression fixture utilized by Bauer employs perforated plates upon which carbon fiber material is placed in order to facilitate circulation of the densifying material.

Therefore it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to employ a compressing/constraining fixture with a plurality of perforations such as that employed by Bauer in the method disclosed by Snyder for the purpose, as disclosed by Bauer, of employing a fixture that promotes production of a part having tight density and physical dimension tolerances with appropriate strength (col. 1, lines 26-35) by accurately constraining the substrate/preform to its formed configuration (col. 3, lines 15-17). Additionally it is noted that the density and thickness of the article compressed in the fixture are impacted by the pressure employed. As such, one would have to take all of these variables into consideration when determining the pressure at which to compact the fibers. As such, the pressure would have been readily optimized as is routinely practiced in the art.

Snyder does not expressly disclose the claimed temperature conditions. However, Ockers discloses that it is known in the art of producing composite materials by resin transfer molding to place the preform in the mold and to preheat the mold, and thus the preform with it, as needed for the application to aid in resin flow (paragraphs [0006 and 0017]).

Therefore it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to preheat the preform and heat the mold as claimed within the resin transfer molding process disclosed by Snyder by heating the mold, and the preform with it prior to the injection of resin as suggested by Ockers for the purpose of improving resin flow in

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the mold, as is routinely practiced in the art. Regarding the specifically claimed temperatures, Ockers discloses the heating is performed as needed for the application (paragraph [0006]) and thus would have been readily optimized as is routinely practiced in the art. Additionally, the examiner notes MPEP section 2144.05 II regarding the patentability of temperature differences:

“Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical.”

Claim 17 is rejected under 35 U.S.C. 103(a) as being unpatentable over Hecht (U.S. 5,654,059) in view of Bauer (U.S. 3,991,248) and Ockers (U.S. 2003/0214081).

Regarding claim 17, Hecht teaches a method of manufacturing a preform for brake friction components (col. 7, lines 20-21) comprising: placing carbon fibers comprising loose fibers in the absence of binders (col. 4, lines 55-61; col. 5, lines 43-48) into a constraint fixture having a bottom plate (col. 14, lines 54-56), and an internal area corresponding in shape to the shape of the desired preform (col. 4, lines 55-62; col. 7, lines 21-24), with the internal area being defined by flat faces/plates (col. 7, line 23) that are perforated (col. 7, lines 28-34) and annular (col. 7, lines 21-24) including a perforated annular ejector/stripper plate (col. 15, lines 10-14) and a perforated annular top plate/closure (col. 7, lines 28-33) with an inner and outer wall (col. 14, lines 54-56), compressing/compacting the carbon fiber material with a needle press to form a fibrous matrix (col. 10, lines 57-60; col. 11, lines 10-13), and subjecting the material in the constraint fixture to further densification resin transfer molding (col. 9, lines 63-col. 10, line 8; col. 12, lines 49-51; col. 15, lines 21-25; col. 15, lines 67-col. 16, line 5).

Hecht teaches the loose fibers are produced from chopped tow (col. 6, lines 21-22). The tow is sprayed/flows in a continuous stream into the constraint fixture (col. 6, lines 46-64; col. 7, lines 41-47).

Hecht does not expressly state that the constraint fixture is removed from the mold apparatus/needle press prior to subjecting the material in the constraint fixture to further densification, but only that that the mold may be fitted with a removable closure (col. 7, lines 28-39).

However, Bauer discloses in an analogous method of producing fiber reinforced composite materials employment of a portable constraint fixture/compression fixture that is adjusted to accurately control the density and thickness by an adjusting/molding apparatus, (Figures 14; Figures 6; col. 2, lines 65-col. 3, line 7; col. 5, lines 16-20; col. 7, lines 6-35) by compressing the material to form a shaped substrate/preform of optimum fiber volume and density (col. 8, lines 15-33) and then placing the preform/substrate while it is still held by the fixture into a furnace for densification (col. 11, lines 19-42) which intrinsically involves removing it from where the adjusting process took place.

Therefore it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to employ a compressing/constraining fixture such that the preform/substrate is held by the fixture during movement between processing steps as disclosed by Bauer in the method disclosed by Hecht for the purpose as disclosed by Bauer and suggested by Hecht (col. 7, lines 16-40) of employing a fixture that promotes production of a part having tight density and physical dimension tolerances with appropriate strength (Bauer: col. 1, lines 26-35) by accurately constraining the substrate/preform to its formed configuration (Bauer: col. 3, lines 15-17).

Additionally, Ockers discloses that it is known in the art of producing composite materials by resin transfer molding processes to place the preform in the mold and to preheat the mold, and thus the preform with it, as needed for the application to aid in resin flow (paragraphs [0006 and 0017]).

Therefore it would have been *prima facie* obvious to one having ordinary skill in the art at the time of the claimed invention to preheat the preform and heat the mold as claimed within the resin transfer molding process disclosed by Hecht by heating the mold, and the preform with it prior to the injection of resin as suggested by Ockers for the purpose of improving resin flow in the mold, as is routinely practiced in the art. Regarding the specifically claimed temperatures, Ockers discloses the heating is performed as needed for the application (paragraph [0006]) and thus would have been readily optimized as is routinely practiced in the art. Additionally, the examiner notes MPEP section 2144.05 II regarding the patentability of temperature differences:

“Generally, differences in concentration or temperature will not support the patentability of subject matter encompassed by the prior art unless there is evidence indicating such concentration or temperature is critical.”

Response to Arguments

Applicant's amendment to the claims filed July 11, 2007 has overcome the 35 USC 112, second paragraph rejection and the rejection of claim 17 over Snyder in view of Ockers. However, a new grounds of rejection of claim 17 over Snyder in view of Bauer and Ockers has been set forth above.

As an initial matter the examiner notes that applicant's arguments address the rejection of claims 9, 12, 15 and 16 over Hecht in view of Bauer, but do not expressly address the rejection of claims 9, 12, 15 and 16 over Snyder in view of Bauer. However, applicant's arguments are substantially directed to the Bauer reference and are applicable to both primary references.

Applicant argues that Bauer teaches it is preferable to remove the bonded substrate from the compression fixture prior to accomplishing the densification step. Accordingly, there is

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no reason for one having ordinary skill to disregard this approach. The examiner disagrees for two reasons.

First, it is noted that the examiner cited col. 11, lines 19-42 in Bauer as the step teaching the argued densification limitation and not the separate "densification" step disclosed by Bauer at col. 12, lines 5-35. While Bauer does not use the word "densification" to describe the "bonding" step, it is noted that the bonding step intrinsically increases the density by one of the claimed densification processes and is explicitly performed with the material still being held in the compression fixture. As such, the claim limitation is met in this manner and the motivation for the combination is set forth in the rejection above. The examiner notes that the claims do not exclude additional processing steps or further densification steps.

Second, even if the combination to Bauer is with the "densification" step of col. 12, the examiner notes that Bauer states that it is "not required" (col. 12, lines 14) to remove the substrate from the compression fixture. Accordingly, leaving the substrate in the compression fixture, while not "preferable" is not excluded or taught away from by the Bauer reference.

Applicant argues that none of the references teach the claimed pressure or temperature and that the examiner's suggestion that these are optimizable variables fails because the art does not teach pressures or temperature that encompass or overlap the claimed range.

Regarding pressure, the examiner notes that the references broadly disclose "compressing/compacting" and further notes that Bauer, for example, discloses that the compression is chosen to determine the fiber volume and density of the shaped substrate (col. 8, lines 15-17). As such, the examiner maintains that the compression/pressure is disclosed as a result effective variable and that one having ordinary skill would have readily determined the pressure required to achieve the desired substrate density and volume. Further regarding the temperature limitations, the prior art broadly discloses heating. Accordingly, it is the examiner's

position as set forth above that the determination of the suitable operating temperatures within the broadly disclosed heating of the prior art would have been readily optimized.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Jeff Wollschlager whose telephone number is 571-272-8937. The examiner can normally be reached on Monday - Thursday 7:00 - 4:45, alternating Fridays.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Christina Johnson can be reached on 571-272-1176. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

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Jeff Wollschlager
Examiner
Art Unit 1791

October 11, 2007



CHRISTINA JOHNSON
SUPERVISORY PATENT EXAMINER